A critical appraisal of "Rate and maintenance of improvement of myofascial pain with dry needling alone vs. dry needling with intramuscular electrical stimulation: a randomized controlled trial"

By

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Abstract

The purpose of this paper is to provide a critical appraisal of the article “Rate and maintenance of improvement of myofascial pain with dry needling alone vs. dry needling with intramuscular electrical stimulation: a randomized controlled trial.” This appraisal began as an attempt to find relevant research comparing the practice of dry needling (DN) to dry needling with intramuscular electrical stimulation (DN/IMES) with regards to treating myofascial pain syndrome (MPS). The article was found through the Gale Onefile database, and it directly compares the two methods in questions. The authors make a thorough introduction of DN, DN/IMES and MPS, siting previous studies done on the topics, and identifying outcome measures for their own study. This single-blinded study compared two research groups, one receiving DN treatment and the other DN/IMES, without having a non-treatment control group to compare to. Both groups saw statistically significant improvement in NPRS and NDI scores over the 12-week period. However, the authors fail to recognize the potential benefits of the DN/IMES seeing significant improvements in NDI scores over the first 3 weeks, while the DN group did not. The authors do not use the MCID scores for NDI or NPRS to determine clinical significance. If they did, they would see that the DN/IMES group was the only one with clinically significant improvements throughout the study. Both DN and DN/IMES have the potential to relieve pain in patients with MPS. While the authors of the article fail to recognize the differences between the DN and DN/IMES groups, their data shows that DN/IMES at least has the potential to provide quicker and longer lasting pain relief. Further research is needed, using clinically accurate methods, to firmly establish whether one treatment method is more clinically significant than the other.

Key words

Dry needling, electrical stimulation, myofascial pain

Introduction

MPS caused by myofascial trigger points (MTrPs) can be a significant source of pain for athletes and individuals. Without ever even pulling a muscle, the pain from these trigger points can be severe enough to limit performance and interfere with activities of daily living. Interventions such as DN have sought to relieve the pain caused by MTrPs. The addition of intramuscular electrical stimulation to DN has been introduced to further improve the results of DN on MPS relief. The purpose of this critical appraisal is to evaluate the validity of this article's claim that DN/IMES is no more effective at treating MPS than DN alone.

Methods

Research began with the intent to compare DN to DN/IMES at relieving MPS. By searching various databased with the search terms "dry needling" and "electrical stimulation" the Gale Onefile database had the most articles on the subject. The article was subsequently chosen from these results. Limits placed on the search results included "full articles" in order to analyze methods and results of studies. Studies met the inclusion criteria if they were blinded clinical trials with human subjects. Total search hits found before choosing an article was 44.

The article, mentioned above, was chosen from these results. It was published in the Journal of Manual & Manipulative Therapy in 2021 and was written by Kindyle Brennan, Katherine M. Elifritz, Megan M. Comire and Daniel C. Jupiter. The study was conducted at the University of Mary Hardin-Baylor. This article was chosen because it directly compared the two modalities in question and met the inclusion criteria.

Results

MPS is defined as "the presence of sensory, motor, and/or autonomic symptoms caused by the presence of MTrPs." MTrPs are characterized as "hyperirritable nodules located within a taut

band of muscle." The article attempts to identify whether the practice of DN is improved with the addition of intramuscular electrical stimulation in treating MPS. The researchers gathered 53 volunteer participants from the community, each of which had "at least one palpable myofascial trigger point" in their upper trapezius. After being randomly assigned to either DN or DN/IMES groups, participants underwent treatment by a licensed professional who'd been practicing DN for 9 years. Treatments occurred once a week for 6 weeks for both groups. Outcome measures used were the Neck Disability Index (NDI) and the Numeric Pain Rating Scale (NPRS) presented to the subjects at 3-week intervals starting with the first treatment. Results showed no statistically significant difference between the groups regarding demographics or baseline NDI or NPRS. The DN group showed statistically significant improvements in NDI and NPRS over the 6-week treatment period, but not within the first 3 weeks. The DN/IMES group showed significant improvements in NDI scores at both 3 and 6 weeks, and significant NPRS improvements after 6 weeks. Both groups maintained improved NDI and NPRS scores 6 weeks after treatments stopped. According to the study, there was no significant evidence to support that DN/IMES is any more effective at treating MPS than DN alone.

Appraisal of the study introduction

The introduction thoroughly summarizes MPS and the reasons why finding alternative methods of treating it would be beneficial. It sites current research stating the effectiveness of DN while also explaining where research is lacking. It further introduces the practice of DN/IMES and summarizes several relevant studies in support of it as well. Most of the studies referenced were from credible journals and were written within the last decade. The conclusion from the literature sited is that both methods, DN and DN/IMES provide positive results to patients with MPS. Both dependent and independent variables were identified. The introduction is very well written and

clearly explains the objective of the study, hypothesizing that DN/IMES is no more effective than DN alone.

Appraisal of the study methods

This is an experimental, single blinded, prospective, cross-sectional study comparing two groups, one receiving DN treatment and the other receiving DN/IMES to treat MTrPs of the upper trapezius. 53 volunteers met the inclusion criteria. 8 individuals discontinued after trials began (5 from scheduling issues and 3 from vasovagal responses associated with the trial). The researchers recognized that performing these interventions in sitting rather than in prone could "lead to a vasovagal response" yet continued this treatment method anyways. The article claims that this method was chosen for "pragmatic reasons", but it is unclear what those reasons are. Of the 3 individuals who left the study due to vasovagal responses, 2 were from the DN group and 1 was from the DN/IMES group. This could have implications on how electrical stimulation affects the vasovagal response to DN, but overall, it is statistically insignificant. Group assignments were random and blinded however, the individuals conducting the study and the clinicians were not. There was no, non-treatment control group in the study, making it difficult to know if the treatments are contributing to improvement or simply the body's natural healing process. The interventions used were well detailed and could be easily replicated by another study group. Each group received intervention once a week. While this was probably done for scheduling purposes, it does not reflect a realistic patient population of individuals seeking outpatient physical therapy to treat MPS, who would likely receive interventions at least twice a week. The NDI and NPRS were used as outcome measures. Both tools are subjective to patient perception and reliability of the tools was not clear. Data was analyzed and compared using a t-test which suits a comparison of two groups.

Appraisal of the study results

The results section of the article establishes congruency between the two groups prior to experimentation and goes on to state the NDI and NPRS scores collected throughout the study. Improvement was measured using these results. Statistically speaking, NPRS scores improved significantly from week 0 to week 6 for both groups ($p=.02$ for both). NDI scores for DN/IMES group improved significantly between week 0 to week 3 ($p=.029$) and both groups improved significantly from week 0 to week 6 ($p<.001$ for DN/IMES group and $p=.01$ for DN group). NPRS is a scale from 0-10 with a Minimal Clinically Important Difference score (MCID) of 1 point for musculoskeletal pain. The DN/IMES achieved this over the 12-week study while the DN group did not. NDI is a scale of 0-50 with the MCID being 7.5. The DN/IMES group showed more improvement but neither group met the MCID. MCID and applying the statistical analysis to clinical outcomes was not touched on by the authors of the article.

Appraisal of the study discussion

The authors do not dive deeply into the meaning of their findings other than restating them and comparing them to other studies. Limitations of the study are recognized as the sample group not being "representative of the overall population," the methodology "was not performed exactly to clinical standard," and the subjects were treated while sitting, which could "lead to a vasovagal response" instead of in prone. Researchers also "discovered a ceiling effect with the NDI, because baseline NDI scores were 6.5/50 and 8.5/50 for the DN and DN/IMES groups, respectively. Scores of < 5.0 out of 50 are classified as 'no disability', leaving little room for improvement." Their conclusion seems to be biased toward their initial hypothesis without recognizing the differences between the group findings. While the group findings were very similar, the DN/IMES group was the only one with statistically significant changes within the first 3 weeks. The DN/IMES is also the only group to meet MCID criteria

for any category. Authors of the article recognize that “more investigation into intermediate and long-term follow-up is warranted” and that “more studies are needed to investigate whether IMES is a worthy adjunct to DN.” Long term follow-up with the study group seems unnecessary, as neither DN nor DN/IMES are shown to prevent future MTrPs and new pain after 6 weeks of discontinued use may be due to new MTrPs’. The authors fail to mention potential implications of their study other than “dry needling treatment continues to demonstrate promise for the treatment of MPS.” They fail to recognize the potential implications of DN/IMES showing more rapid NDI score improvement.

Discussion

This study has the potential to add additional tools to the repertoire of physical therapists who treat patients with MPS. While the authors fail to recognize the potential implications of the faster and more sustained recovery of DN/IMES, the data collected could indicate faster, longer lasting improvements for patients with MPS. This could help athletes return to competitions and patients return to activities of daily living quicker with more sustained relief.

The research on DN and DN/IMES is still limited, and the claims of this article do not favor one method over the other. However, both DN and DN/IMES are shown to be safe and effective methods to treat MPS. Further research on both methods is recommended with methods more accurately resembling clinical practice in order to study the full potential of either method.

While the authors seem intent on proving their hypothesis to be valid, the data obtained through their study, and the studies referenced in their article, would justify using either method, DN or DN/IMES, on a patient with MPS. Both practices are already being performed safely and appropriately in clinics throughout the United States for treatment of MTrPs. DN and DN/IMES appear to be useful methods allotted to physical therapists to relieve pain.

The authors of this article have done thorough literary research on DN, DN/IMES, and MPS. Their research methods, while lacking a non-treatment control group, where thorough and showed relevant data pertaining to the improvement of pain caused by MPS using these treatments. While clear implications of the potential benefits of either DN or DN/IMES are not stated in the article itself, physical therapists should feel comfortable using either method to treat patients with MPS based on current research.